Method for controlling the selection of base stations in a cellular radio telecommunications system

In the terminal equipment domain of telecommunications, radio paths are becoming increasingly important. Cordless telephones, mobile radio terminals and the wireless connection technology "RLL" (Radio in the Local Loop) or "WLL" (Wireless Local Loop) are well-known examples of this. With the aim of defining a standard for a high-performance and universal air interface, an air interface known as "DECT" (Digital Enhanced (formerly: European) Cordless Telecommunication) was defined at the instigation of European companies. The DECT standard is described in the documents ETS (European Telecommunication Standard) 300 175-1, ..., October 9 1992 of the ETSI (European Telecommunication Standards Institute) and is known therefrom.

A DECT system allows up to 120 simultaneous connections between base stations and mobile units - which are furthermore understood to include not only mobile terminals but also, as, for example in the wireless connection technology "Radio in the Local Loop", stationary system components which communicate with a base station via an air interface and which include the functional scope of a mobile unit -, whereby up to 10 frequencies between 1.88 and 1.90 GHz are available and up to 12 simultaneous duplex voice connections (time slots, voice channels) can be implemented per frequency.

Furthermore, interworking between DECT and "ISDN" (Integrated Services Digital Network) is specified in the DECT standard. Along with the time slots (channels) at 32 kbit/s ("Full Slots") and 8 kbit/s (" Half Slots") required for voice connections, time slots with a

transmission rate of 64 kbit/s provided to support ISDN are therefore also specified.

Base stations and corresponding mobile units are generally known which, for faster data transmission of, for example, 64 kbit/s or to support DECT/ISDN interworking, support transmission rates of both 32 kbit/s "Full Slots" and 64 kbit/s "Double Slots"; that is to say up to 6 channels with a transmission rate of 64 kbit/s, i.e. a maximum of 2 complete ISDN connections comprising two base channels "B-channel", each at 64 kbit/s, and one control channel "D-channel" at 16 kbit/s, are provided.

"Scanning" of local radio devices to determine free and occupied channels, which is carried out by all DECT devices at least every 30 seconds as a background process, is known from the DECT standard. The information determined in this way is stored in a list known as the RSSI ("Received Signal Strength Indication") list, where free channels with little interference are identified by high values and occupied channels with substantial interference are identified by low values - for subsequent selection. If a radio cell is supplied with radio resources by two base stations, or if these base stations partially cover a common radio coverage area (overlapping of radio cells), whereby the first base station supports only "Full Slots" and the second base station both "Full Slots" and "Double Slots", a mobile station which supports "Full Slots" and also "Double Slots" and which, for example, requires the voice transmission service, i.e. a transmission rate of 32 kbit/s ("Full Slots"), requires a facility to determine which base station provides this service.

In terms of a universal telecommunications system "Universal Mobile Telecommunication System" UMTS, it is also conceivable for two base stations to supply two

different

telecommunications systems, for example a first base station supplies a DECT radio area and a second base station supplies a "Global System for Mobile" GSM radio area, whereby the radio coverage areas totally or partially overlap each other for the implementation of the UMTS. Mobile units which support both systems therefore similarly require a facility to distinguish between these base stations.

The object of the invention is therefore to indicate a method for controlling the selection of base stations in a cellular radio telecommunications system, in which the radio transmission resources made available in the radio telecommunications system, in particular in an RLL or WLL system, are effectively used.

This object is achieved by the features of claim 1.

In the method according to the invention - according to claim 1 - connection-relevant data are stored in at least one memory in at least one radio cell of a cellular radio telecommunications system by at least one radio device which supports at least one first service and one second service. Base stations signal which services they respectively support. Primary data records of base stations, which signal the support of the first service, are stored by the radio device in a first list, and secondary data records of base stations, which signal the support of the second service, are stored in the second list. The connection-relevant data are therefore stored in the lists, separated according to services. If the signaling changes, the lists are updated accordingly - claim 1.

An essential advantage of the method according to the invention is the storage, separated according to supported services, of the

data of a plurality of base stations, which offer themselves as alternatives for the support of a specific service.

An essential advantage of the further development according to claim 2 is the guarantee that a connection is set up to the base station with the best transmission characteristics.

An essential advantage of the further development according to claim 3 is a simplification of the method, since the structuring of the list is carried out independently of measurements of the base stations.

The essential advantage of the further development according to claim 4 is the simple and low-cost implementation of the method, since no additional measurements or data evaluation are required in order to determine the sequence of data records within a list.

An essential advantage of the further developments according to claim 5 (without pause time) and claim 6 (with pause time) is the guarantee that a connection is set up.

Further advantageous designs of the invention are indicated in the remaining subclaims.

An embodiment of the invention is explained with reference to FIGURES 1 and 2, in which:

FIGURE 1 shows a radio telecommunications system with base stations, mobile stations and a network termination designed as a mobile station,

FIGURE 2 shows a flow diagram of the method for selecting base stations in the radio

telecommunications system according to FIGURE 1.

FIGURE 1 shows a telecommunications system designed as a DECT system with radio cells PC1 and PC2 designed as picocells. Information is transmitted in each case via a DECT air interface designed according to the DECT standard, via which the "DECT radio channel" wireless transmission medium is accessed through a combination of FDMA, TDMA and TDD access methods (Frequency Division Multiple Access / Time Division Multiple Access / Time Division Duplex). Ten carrier frequencies, each with a channel spacing of 1.728 MHz, are available in the frequency range between 1880 MHz and 1900 MHz (FDMA), whereby the time frame defined for each carrier is divided up into 24 time slots or channels (TDMA).

For transmitting voice data, DECT fixed parts FP11, FP21, FP22 use time slots with a transmission rate of 32 kbit/s (Full Slot), corresponding to a first service D1. Time slots with a transmission rate of 64 kbit/s, corresponding to the second service D2 (Double Slot), are used by the DECT fixed part FP22 above all for the transmission of packet data. A radio network termination RNT to which a telephone T is connected and a DECT mobile part PP can be connected in a wireless manner to the DECT fixed parts FP11, FP21, FP22 via the DECT air interface. The DECT mobile part PP and the radio network termination RNT similarly support the first service D1 of the DECT system and the second service D2 of the DECT system. The DECT mobile part PP and the radio network termination RNT store connection-relevant data of the DECT fixed parts FP11, FP12, FP21, FP22, which use "Full Slots", as primary data records in the form of a first list L1 in a first memory SP1 and connection-relevant data of the DECT fixed parts FP11, FP12, FP21, FP22, which use "Double Slots", as secondary data records in the form of a second list L2 in a second memory SP2.

Alternatively, it is also possible for the data records or lists L1, L2 to be stored in a single memory.

An alternative embodiment of the radio telecommunications system from FIGURE 1 is provided if the first service D1 is made available within a first radio cell, which, for example, has a radio range according to the DECT standard, and the second service D2 is made available within a second radio cell which, for example, has a radio range according to the GSM standard, whereby the DECT radio coverage area is partially or fully covered by the GSM radio coverage area in order to enable the implementation of a universal telecommunications system, for example UMTS. In this embodiment, the case may occur wherein the type of data in the first service D1 and in the second service D2 are the same, for example voice data, but differ in terms of the different radio ranges of the radio cells in which they are made available. The primary and secondary data records are then stored according to the radio ranges in the first list L1 or the second list L2.

In the event that the types of data transmitted in the first service D1 and in the second service D2 differ from one another (e.g. first service D1: voice data, second service D2: packet data) and are made available in radio cells with different radio ranges, the primary and secondary data rates can be stored in the first list L1 or second list L2 according to the radio range or on the basis of the service D1, D2 which is provided.

In FIGURE 2, the method for selecting base stations is described with reference to a flow diagram, said method being carried out in an arrangement according to FIGURE 1 between the DECT fixed parts FP11, FP21, FP22, the DECT mobile part PP and the radio network termination RNT.

In the initial condition, first DECT fixed parts FP21, FP22 signal to the DECT mobile part PP and the radio network termination RNT which service D1, D2 they support. In addition, the radio network termination RNT receives the signaling of the supported service D1, D2 from the second DECT fixed part FP11. In the DECT mobile part PP and the radio network termination RNT, a check is first carried out to ascertain whether signaling has taken place, i.e. whether an update of the relevant list(s) L1, L2 is required.

If this is the case, the primary data records from the DECT fixed parts FP11, FP21, FP22 signaling the support of the first service D1 are stored in the form of the first list L1 in the memory SP1, SP2 and/or secondary data records from the DECT fixed parts FP11, FP21, FP22 signaling the support of the second service D2 are stored in the form of the second list L2 in the memory SP1, SP2. The sequence of the data records stored or to be stored in the lists L1, L2 is derived from the sequence in which the signaling is received.

Alternatively, the data records stored or to be stored can be arranged within the list L1, L2, according to transmission characteristics of the corresponding DECT fixed parts FP11, FP21, FP22, or according to ordering criteria based on the type of data records stored or to be stored, e.g. alphabetically or numerically.

If this is not the case, i.e. an update is not required, a connection request is expected.

If the DECT mobile part PP or the radio network termination RNT wishes to set up a telecommunications connection, a first data record of the primary or

secondary data record is in each case read from the relevant list L1, L2 in order to initiate the connection set-up according to the required service D1, D2. The associated DECT fixed part FP11, FP21, FP22 is then determined from the data record and the connection to this DECT fixed part FP11, FP21, FP22 is set up. If this connection is not established, a second (further) data record of the primary or secondary data records is read from the relevant list L1, L2 and a connection initiation is started. If no further data record exists within the list L1, L2, the procedure restarts with the first data record of the list L1, L2.

Alternatively, if no further data record exists, following a predefined pause time, during which the telecommunications connection set-up is temporarily impossible (e.g. interruption of the telecommunications connection set-up), the procedure can restart with the first data record.